Montana Energy Summit
April 22, 2008
Ancillary Service – Regulating Reserves

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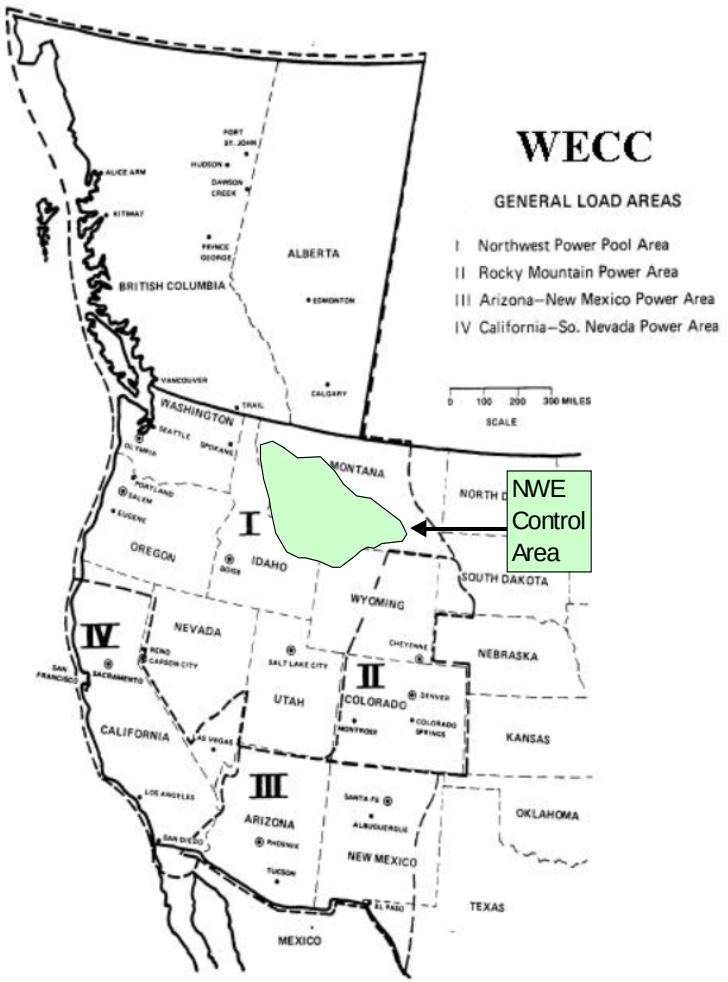
TRANSMISSION OVERVIEW



Control Area Concepts

- **Control Area or Balancing Authority Must balance loads and resources (supply and demand) on a moment by moment basis.**
  - » **Requirement – 60 cycles/second (Hz)**
  - » **System slows down when load>gen**
  - » **System speeds up when gen>load**
  - » **Frequency is the same in all of WECC**
  - » **Equipment is extremely sensitive to frequency**
    - ♦ **We start tripping load at 59.5 Hz**
- **Not always geographical**
  - » **Colstrip project is in 5 C/As**
    - ♦ **Puget, Portland, PacifiCorp, Avista, NorthWestern**
  - » **Defined by telecom signals "telemetry"**

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Regulation Criteria

- **Control Area Must Balance Load with Generation**
  - **The difference between the planned and actual balance is called the Area Control Error (ACE)**
    - $ACE = (Ni_A - Ni_S) - 10\beta (f_A - f_S)$
    - **ACE = Actual Interchange – Scheduled Interchange adjusted by frequency difference**
    - **Automatic Generation Control (AGC) adjust regulation resources to draw ACE toward zero**
  - **A control area MUST have sufficient Regulating Reserves to meet NERC/WECC mandatory performance criteria.**
- **Two control performance standards.**
  - **CPS1 - rolling 12 month average that is a statistical measure of ACE variability and its relationship to frequency Error.**
  - **CPS2 - a statistical measure designed to limit unacceptably large net unscheduled power flows.**

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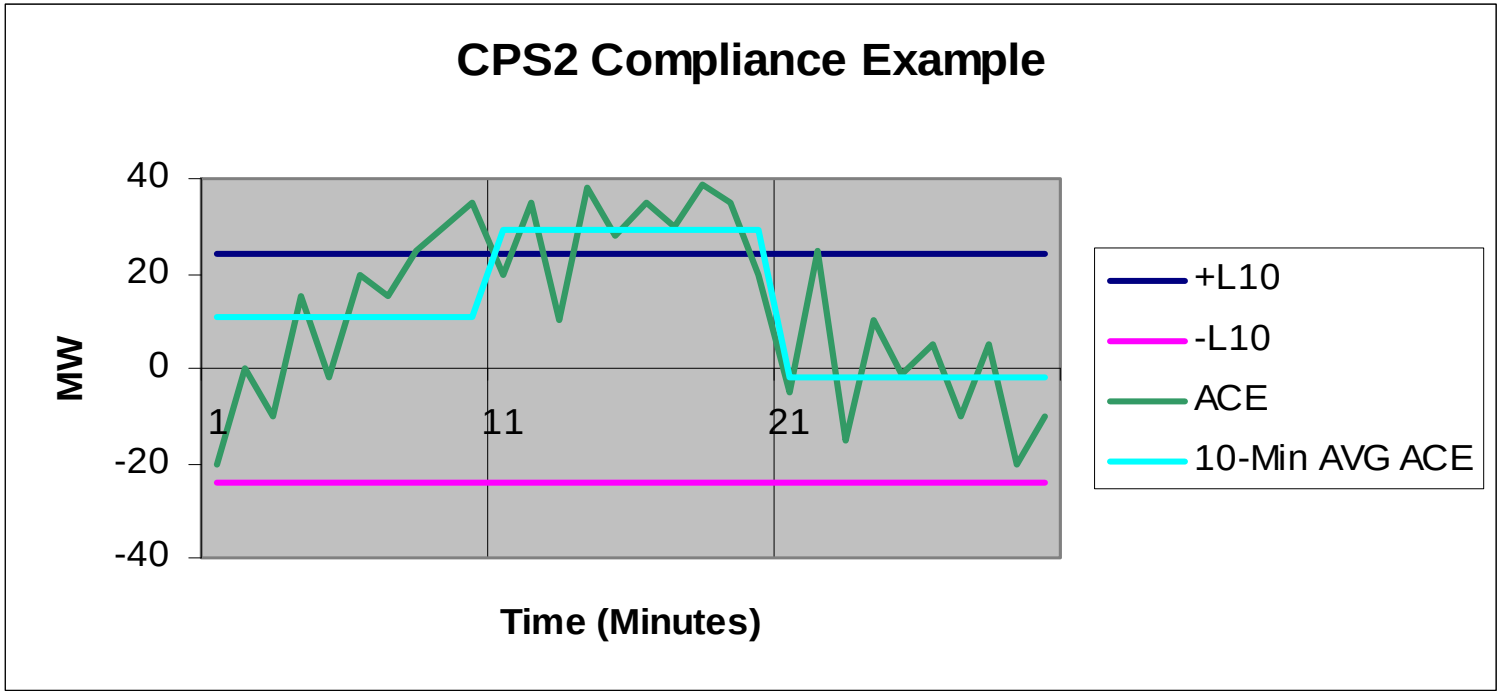
CPS2

- **The following chart shows the ACE, L_{10} band, and average ten-minute ACE for a 30 minute period. The second ten-minute average is in violation since it exceeds L_{10}.**



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Where have we been?

- **Regulating Reserves – NWE is a unique balancing authority with no resources capable of providing regulating reserves**
- **NWE contracts with 3rd party providers – and has since the mid-80s**
- **Historical need for 60 MW of regulating capacity**

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Where have we been? Wind Integration

- **Traditional Needs**
  - » Historical Transmission Customer Resource (before wind integration)
  - » Idaho Power contract – 60 MW
- **Wind Integration**
- **Requires much higher quantity of regulating reserves to integrate wind**
  - » Purchased 25 MW of regulation for 135 MW of wind
  - » Compared to 60 MW of regulation for 1700 MW of load
- **Regulating reserves to support the new wind generation**
  - » 25 MW ~18% of default supply wind resource
- **Costs are significantly increasing for this product….**

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Historic Need for Regulating Reserves

- **The measure of need is quite simple on NorthWestern's system**
- **Required by FERC/NERC to balance loads and Measures this balance over 10 minute periods of each month – CPS2**
- **Prior to the startup and integration of Judith Gap, NorthWestern consistently met the standard**
  - **Failed to meet standard in 4 months in 2006**
  - **Failure to meet standards could cause significant reliability issues and may lead to civil penalties**

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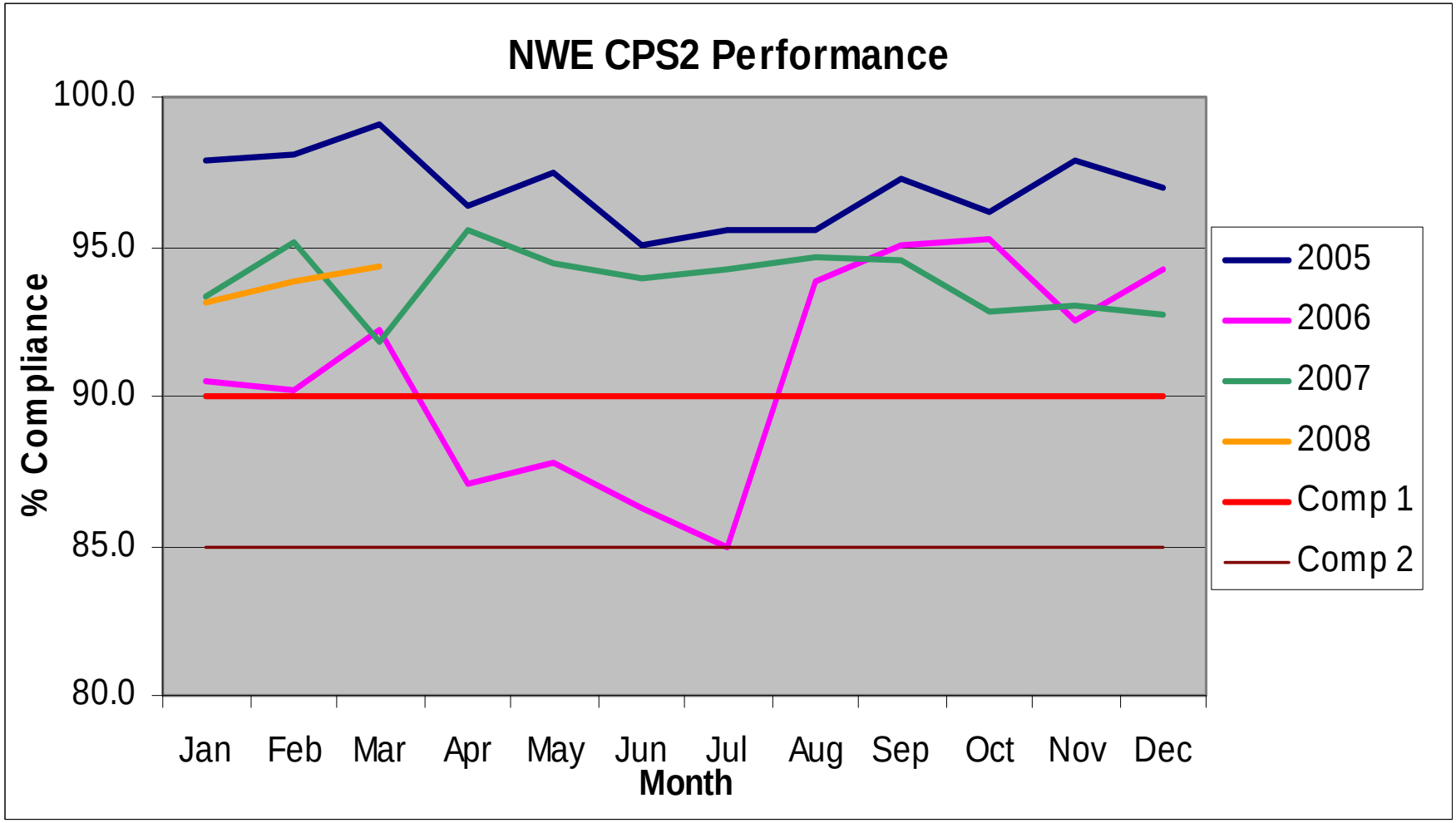
NWE Historic CPS2 Performance



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What more are we doing?

- **NWE is participating in ACE Diversity Interchange (ADI) with Idaho Power Company, PacifiCorp, and British Columbia Transmission Corporation**

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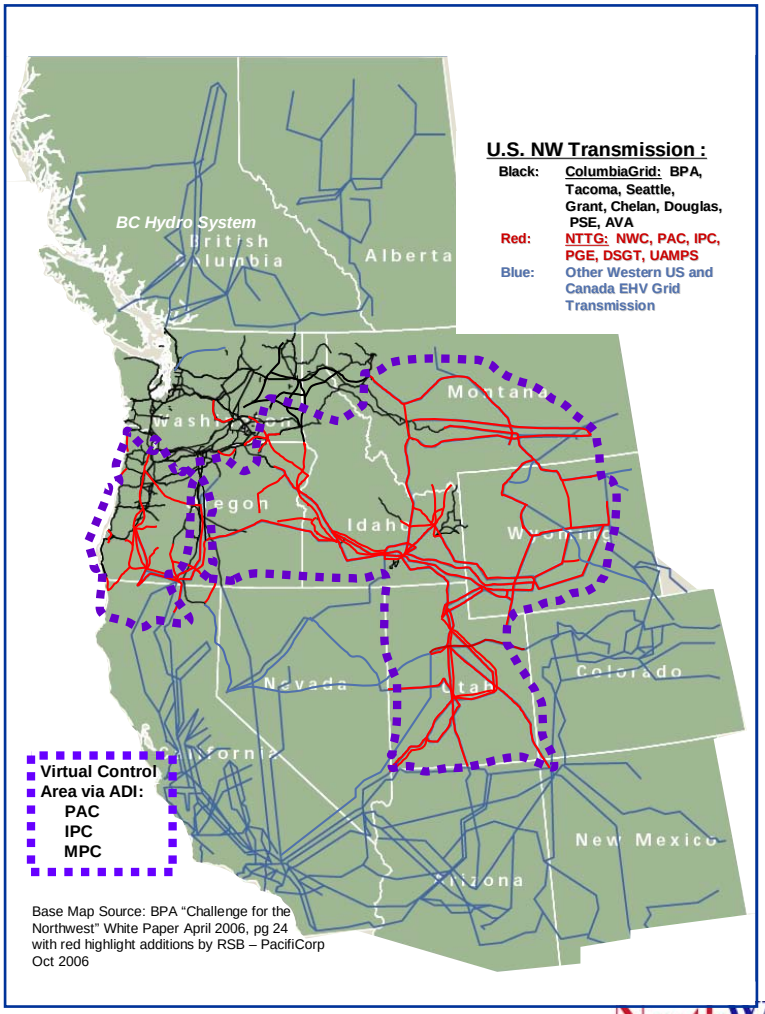
Current Scope of ADI

- **Current Scope of ADI:**
- **Initial Participating Control Areas are:**
  - » **Idaho Power Company**
  - » **NorthWestern Energy**
  - » **PacifiCorp – Eastern Control Area**
  - » **PacifiCorp – Western Control Area**
- **British Columbia Transmission Corporation is the "host" of this activity.**
- **Any control area operator located in the WECC and adjacent to and interconnected with one or more Participating Control Areas may join as a new ADI participant.**
- **Arizona Public Service, Sierra Pacific Resources, and Public Service New Mexico have signed the Agreement and integration to begin June 2008.**



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What is ACE Diversity Interchange or ADI?

- **ADI is the pooling of individual Area Control Errors (ACE) to take advantage of control error diversity (momentary imbalances of generation and load).**
- **By pooling ACE the participants will be able to:**
  - **Reduce control burden on individual control areas**
  - **Reduce unnecessary generator control movement**
  - **Reduce sensitivity to resources with potentially volatile output such as wind projects**
  - **Realize improvements in Control Performance Standards**
- **While ADI may help, it <u>will not</u> replace need for regulating reserve resources**

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Request for Proposals

- **Getting more difficult to find Regulating Reserve products.**
- **Began RFP process in November 2006 for longer term needs beginning January 1, 2008. Existing Transmission contract expired December 31, 2007**
  - **Very few proposals received 1/15/2007**
  - **Transmission negotiated 2 agreements to replace traditional 60 MW agreement**
  - **Energy Supply extended arrangement with Avista for self provision of Regulating Reserves for Judith Gap Integration**

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Description of Transmission Group Contracts

- **The new agreements replace what NWE had.**
- **Term of Agreements: One Year - January 1, 2008 – December 31, 2008**
- **Agreements filed and accepted by FERC late in 2007**

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Energy Supply Contract with Avista

- **Required for wind integration**
- **Term of Agreement: 13 Months – Dec 1, 2007 – Dec 31, 2008**
- **Agreement filed and accepted by FERC**
- **Significant Cost increase for the products and there is no guarantee of continued availability**
  - » **Old Costs – 60 MW - $2.6 million annually for the capacity fee**
  - » **2008 Costs – 85 MW (Transmission and Supply agreements)**
    - ♦ **over $13 million**

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Next Steps - RFP for Service – beginning 1/1/2009

- **On November 8, 2007, NWE issued another Request for Proposal for Regulating Reserve Service to begin January 1, 2009**
  - **Very broadly distributed**
  - **Currently evaluating responses**
- **Supply Evaluating Option of Equity Ownership of Regulation Resource**

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